



# Effect of Therapeutic Diet with Spirulina Supplementation on Anthropometry of HIV Infected Patients

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**ABSTRACT :** Weight loss and low BMI is common syndrome seen in HIV infected patient due to various reasons like adverse effect of drug, higher catabolic rate, reduced functioning of body organs, reduced immune functioning, low food intake and improper digestion which contributes adversely to overall weight loss and low BMI in HIV patient. Hence, study was under take to determine the impact of Spirulina supplementation on body weight and BMI of HIV infected patients. Study was conducted on 62 HIV infected patients where 29 patients were assigned randomly as T<sub>0</sub> (Control group) and another 32 patient present who were considered as T<sub>1</sub> (Treatment) receiving therapeutic diet along with 5 g/day of Spirulina supplementation in form of capsule for period of six months. Patients were followed up at regular interval of two weeks to assure that they take regular Spirulina supplementation, to develop good rapport and to stop dropout rate. During course of study patients were advised to continue their medical prescription. Data was compiled and the results were analyzed using suitable software and appropriate statistical methods. Result stated that weight decreased by 1.092 kg (male) and 1.323 kg (female) in control group. Treatment group showed increase in weight by .720 kg (male) and .820 kg (female). BMI in control group found to be decrease by 0.379 (male) and 0.517 (female), but that of treatment group showed increase in BMI by 0.245 (male) and 0.33 (female) in HIV patients receiving Spirulina supplementation.

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In 1981, Clinicians in the city of New York and California first observed an immunodeficiency syndrome among young, previously healthy homosexual men who had rare diseases such as Kaposi sarcoma and opportunistic infections like *Pneumocystis carinii* pneumonia and unexplained persistent lymphadenopathy. The term Acquired Immunodeficiency Syndrome (AIDS) was used to describe the condition. Infectious micro-organism

responsible for condition was transmittable through sexual contact and/or through blood transfusion (MMWR, 1981; Fauci, 2003 and Hoffman, 2004). HIV-infected patient is at nutritional risk at any point in their illness. Severe under nutrition, weight loss, particularly loss of lean tissue, and delayed weight gain and height velocity in children are commonly encountered. Elevated levels of triglyceride and serum cholesterol are common symptoms seen in HIV infected

patient leading to increased cardiac risk. (Judith *et al.*, 2003) *Spirulina* (Cyanobacterium) is a blue green algae which exist as a single cell organism. It is believed to be first living organism on earth that converts sunlight into food or life energy by process of photosynthesis in the presence of sunlight and water. It has evolution history of more than 3.6 billion years (Nelissen *et al.*, 2002) Cyanobacterium *Spirulina* (*Spirulinaplantensis*) represents larger group of blue green algae of prokaryotic kingdom. This single cell protein (SCP) are oldest oxygen photosynthetic organism known so far and are rich source of novel bioactive metabolites including many cytotoxic, antifungal and antiviral compound (Rajbir *et al.*, 2004). Sulfated-polysaccharide, calcium spirulan (Ca-SP) isolated from *Spirulinaplantensis* found to inhibits the replication *in vitro* of several enveloped viruses including Herpes simplex type I (HSV-1), human cytomegalovirus (HCMV), measles virus, mumps virus, influenza A virus, and HIV-1 virus Hayashi *et al.* (1993).

## RESEARCH METHODOLOGY

This was a prospective study conducted over a period of 6 month. The study included 62 confirmed HIV positive patients. HIV patients were divided in to two groups T<sub>0</sub> (Control group) and T<sub>1</sub> (Treatment group) which received therapeutic diet with Spirulina supplementation of 5 g/day in capsule form for period of

six months. T<sub>0</sub> (Control group) include 20 male and 9 female and T<sub>1</sub> (Treatment group) included 23 male and 10 female. Blood sample of all HIV patients was analyzed for triglyceride and serum cholesterol level at beginning of study and at the end of study.

## Statistical methods :

Descriptive statistical analysis was carried out in this study using software SPSS 15.0. Results on continuous measurements were presented as mean  $\pm$  SD. Significance was assessed at 5 per cent level. 't' test and 'p' value was used to find the significance of study as described by Gomez and Gomez (1984).

## RESULTS AND DISCUSSION

Weight loss and malnutrition are common in patients with HIV infection or AIDS and are likely to accelerate disease progression, increase morbidity and reduce survival because of the well documented impact of malnutrition on immunity. Even in the current era of highly active antiretroviral therapy (HAART), weight loss and muscle wasting remain significant clinical problems. Malnutrition and weight loss are likely to accelerate disease progression, increase morbidity and reduce survival (Singh and Singh, 2005). Table 1 explains effect of therapeutic diet and spirulina supplementation in male control group (T<sub>0</sub>), weight at the beginning of

**Table 1 : Effect of therapeutic diet and Spirulina supplementary on weight of HIV infected patient**

| Gender | Treatments     | Parameter    | Mean before | Mean after | Mean difference | S.E. of difference | 't' cal | 'p' value |
|--------|----------------|--------------|-------------|------------|-----------------|--------------------|---------|-----------|
| Male   | T <sub>0</sub> | Weight in kg | 57.60       | 56.51      | -1.092          | 1.768              | 0.618   | 0.5406 NS |
|        | T <sub>1</sub> | Weight in kg | 58.38       | 59.1       | 0.72            | 1.648              | 0.44    | 0.6647 NS |
| Female | T <sub>0</sub> | Weight in kg | 47.39       | 46.067     | -1.323          | 1.427              | 0.9265  | 0.3676 NS |
|        | T <sub>1</sub> | Weight in kg | 47.86       | 48.68      | 0.82            | 1.454              | 0.5641  | 0.5797 NS |

\* indicate significance of value at P=0.05, NS = Non-significant, The result is significant at  $p \leq 0.05$ .

T<sub>0</sub>- Control, T<sub>1</sub>- Spirulina supplementation.

**Table 2 : Effect of therapeutic diet and spirulina supplementary BMI of HIV infected patient**

| Gender | Treatments     | Parameter | Mean before | Mean after | Mean difference | S.E. of difference | 't' cal | 'p' value |
|--------|----------------|-----------|-------------|------------|-----------------|--------------------|---------|-----------|
| Male   | T <sub>0</sub> | BMI       | 19.89       | 19.511     | -0.379          | 0.642              | 0.5905  | 0.5584 NS |
|        | T <sub>1</sub> | BMI       | 19.844      | 20.089     | 0.245           | 0.62               | 0.396   | 0.6945 NS |
| Female | T <sub>0</sub> | BMI       | 19.027      | 18.51      | -0.517          | 0.937              | 0.5517  | 0.5886 NS |
|        | T <sub>1</sub> | BMI       | 18.97       | 19.3       | 0.33            | 0.759              | 0.4347  | 0.6689 NS |

\* indicate significance of value at P=0.05, NS = Non-significant, The result is significant at  $p \leq 0.05$ .

T<sub>0</sub>- Control, T<sub>1</sub>- Spirulina Supplementation.



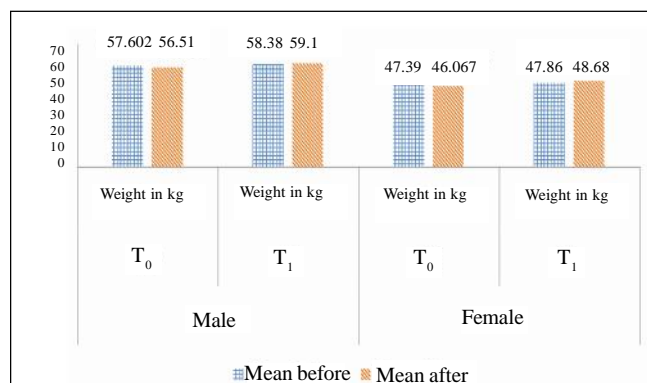


Fig. 1 : Graphical representation of effect of therapeutic diet and spirulina supplementary on weight of HIV infected patients

study was 57.602 kg which decreased to 56.51 kg. Loss in weight was 1.092 kg which was statistically non-significant having 'p' value of 0.5406. Treatment group showed (T<sub>1</sub>) increase in weight by 0.720 kg indicating positive effect of therapeutic diet along with Spirulina supplementation but statically gain in weight was non-significant. In female weigh decreased by 1.323 kg in control group which was non-significant having 'p' value of 0.3676. In T<sub>1</sub> group initial weight was 47.86 kg and final weight was 48.68. Gain in weight was 0.82 kg indicating positive effect of therapeutic diet along with Spirulina supplementation. Statistical analysis shows no significant difference for any treatment as calculated 'p' value was not  $\leq 0.05$  for any of the treatment.

BMI is one of the essential parameter showing nutritional status of individual. In patient receiving HAART treatment increase in BMI is common indicator of positive effect of treatment on HIV patient (Todd *et al.*, 2007) Table 2 explains effect of therapeutic diet and spirulina supplementation on HIV infected patient. In male it was observed that BMI decreased by 0.0379 during study in control group (T<sub>0</sub>). Increase in BMI was seen in T<sub>1</sub> group where gain was 0.245 indicating positive effect of therapeutic supplementation along with Spirulina supplementation. In female BMI decreased by 0.517 in control group and Gain in BMI was 0.33 in T<sub>1</sub> group indicating positive effect of therapeutic supplementation along with Spirulina supplementation. Statistical analysis shows non-significant difference for any treatment as calculated 'p' value was not  $\leq 0.05$  for any of them.

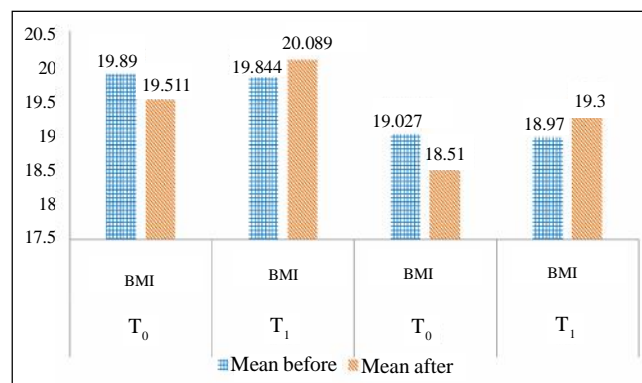


Fig. 2 : Graphical representation of effect of spirulina supplementary on BMI of HIV infected patients

## Conclusion :

Thus, it can be concluded that therapeutic diet with Spirulina (blue green algae) supplementation is help full for HIV infected to increase their body weight and BMI.

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